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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/691,466	10/22/2003	William W. Morey	15436.250.20.1	5948

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EXAMINER	
CHANG, AUDREY Y	
ART UNIT	**PAPER NUMBER**
2872	

DATE MAILED: 08/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H'H

Office Action Summary	Application No.	Applicant(s)	
	10/691,466	MOREY ET AL.	
	Examiner	Art Unit	
	Audrey Y. Chang	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 June 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6 and 8-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 8-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendment filed on June 3, 2005, which has been entered into the file.
- By this amendment, the applicant has amended claims 1-3, 6, 8-9, 12, 20, 25, and 29-30, has canceled claim 7 and has newly added claims 32-33. *The applicant is respectfully noted that the newly added claims **SHOULD NOT** be underlined,* (please refer to 35 CFR 1.121 for the manner of amendment).
- Claims 1-6 and 8-33 remain pending in this application.

Claim Objections

1. Claims 5 and 25-31 are objected to because of the following informalities:

(1). The phrase "retroprisms" recited in claim 5 is confusing and indefinite since it is not clear what is considered to be a "retroprism". (The objection is a repeated objection from previous Office Action).

(2). The amendment to claims 25 adds the phrase "a single fiber optic waveguide for carrying a multiplexed optical signal" that is confusing and indefinite since it is not clear what is the structural relationship between this single fiber optic waveguide and rest of the system and it is not clear how does this "multiplexed optical signal" relate to the system. The scopes of the claims therefore are not clear and indefinite.

(3) The amended phrase "an inputted multiplexed optical signal from the single fiber optic wave guide and through the system demultiplexes the multiplexed optical signal into a plurality of wavelength-distinct channels that are received by the waveguide array" recited in claim 29 is completely confusing

and indefinite. From the amendment to its based claim, (claim 25), it appears that the inputted signals are "de-multiplexed" it is not clear how can a "multiplexed optical signal" being inputted as recited in claim 25. Furthermore, what is "the system demultiplexes the multiplexed signal" if the inputted signal already is de-multiplexed how could the system de-multiplexes it again? Where exactly is the function of the single wave guide and what exactly is the function of the "system" please clarify. The claims are very confusing and the scopes are not defined.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-6, 8 and 10-11 are rejected under 35 U.S.C. 102(e) as being anticipated by the patent application publication by to Rose et al (US 2002/0154855 A1).

Claim 1 has been significantly amended which necessitates the new grounds of the rejections.

Rose et al teaches a *double transmission diffraction grating-based wavelength divisional multiplexer device* (200 or 2100, 3100 as in Figures 21 and 31), serves as the diffractive optics system that is comprises of a *directing element*, including *lenses* (208 and 210), for directing an inputted optical signal to a *first diffractive optical element* (214) and *a second diffractive optical element* (216), positioned at *an angle with respect* to the first diffractive optical element, wherein the first and second diffractive optical elements are configured to transmit and diffracting the directed optical signal into *multiple*

channels of distinct wavelengths. Rose et al teaches that the diffracted multiple channels are then directed to a *light handling device* (2130 or 3104) which can include optical switch array having reflectors (1116, 1516, 2204 or 3202, Figures 14-15 and 22) such that the multiple wavelength channels are *reflected* back to the *second diffractive optical element*, (please see Figures 21-22 and 32-33, paragraphs [0062], [0063], [0071], [0072], [0106] to [0110], [0121] to [0130]).

With regard to claim 2, Rose et al teaches that the multiple channels reflected by the reflector are transmitted through the first and second diffractive optical elements for repeatedly transmitting and diffracting or the grating assembly, (12 or 44).

With regard to claim 3, Rose et al teaches that the multiple channels are transmitted through the first and second diffractive optical elements (44, Figure 4) at least two times.

With regard to claim 4, the directing element (208 and 210 Figure 1 or 4) is a bi-convex lens.

With regard to claim 5, the reflector is a mirror or mirrors, (please see Figures 14-15 and 32).

With regard to claim 6, Rose et al teaches that the first diffractive optical element (214) is angled with respect to the directing element (i.e. the lenses) and the second diffractive optical element (216) is angled with respect to the reflector, (please see Figure 21).
grating assembly (12 or 44) is *angled* with respect to the directing element and the reflector, (please see Figures 1 and 4).

With regard to claim 8, Rose et al teaches that the first and second diffractive optical elements are *transmission* grating having *binary* phase format, (please see Figure 3).

With regard to claims 10 and 11, Rose et al teaches that the multiplex/demultiplexing device has a *waveguide* array (Figure 31) having at least one input waveguide (3102) and at least two output waveguides for receiving the multiple channels from the grating assembly, (3120-3126, Figures 31 and 33).

This reference has therefore anticipated the claims.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent application publication by Rose et al and in view of the patent issued to Chen et al, (PN. 6,563,977).

The *double transmission diffraction grating-based wavelength divisional multiplexer device* taught by Rose et al as described for claim 1 above has met all the limitations of the claim. This reference however does not teach explicitly that to have the second diffractive optical element attached to the reflector. Chen et al in the same field of endeavor teach that a diffractive optical element can be attached to the reflector (Figure 2). It would then have been obvious to one skilled in the art to make the diffractive optical element attached to the reflector for the benefit of making the device with a more compact design.

6. Claims 12-20 and newly submitted claims 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Chen et al.

Chen et al teaches a *multiplex/demultiplexing device* (2, Figure 1 or 40 Figure 4) that is comprised of a *diffractive optics system* (12 or 44) wherein the multiplex/demultiplexing device comprises a *waveguide array* (6, or 43) including an *input* fiber that directs an optical signal into the diffractive optics system. The device further comprises a *directing element* (10 or 50) that directs the inputted optical signal to the diffractive optics system including diffractive optical element (DOE) that diffracts and transmits the directed optical signal into *multiple channels* of distinct wavelengths and a

reflector (8 or 52) that receives the multiple channels from the diffractive optics system and reflects the multiple channels back toward the diffractive optics system, (please see columns 7-8, and 12).

This reference has met all the limitations of the claims with the exception (with regard to claim 7 also) that the diffractive optics system does not include two diffractive optical elements. However, Chen et al in a different embodiment teaches that two identical or similar diffractive optical elements (70 and 72, Figure 6) that are positioned at a *non-zero angle* with respect to each other can be used in the multiplex/demultiplexing device for making the optical signal into multiple channels of different wavelengths. It would then have been obvious to one skilled in the art to apply the teachings of Chen to modify the multiplex/demultiplexing device to use two diffractive optical element or grating assembly placed at a non-zero angle with respect to each other for the benefit of allowing the multiplex/demultiplexing device to have a folded geometric arrangement so that the device can be design to have a desired shape that fits to different application requirements.

With regard to claim 14, Chen et al teaches that the waveguide array is placed at the focal plane of the directing element, (10 or 50).

With regard to claims 15-16, Chen et al teaches that the diffractive optical element is transmission diffraction gratings and it is preferably a *holographic* diffractive grating, (please see column 8, lines 25-30).

With regard to claims 17-18, Chen et al teaches that a polarization-rotating element (14, Figure 1 and 46 Figure 4) is used to prevent polarization dependent loss. This reference teaches the polarization rotating element is a birefringent element but it does not teach that it is placed between the directing element and the first diffractive optical element and it does not tech explicitly that it also include a half wave plate. However Chen et al does teach explicitly that the idea of having the polarization rotation element is to introduce a 90 degree rotation of one component of the polarization light, either in combination with the reflection at the reflector or not, so that P polarized light will be rotated to S

polarized light and the polarization dependent loss can be eliminated. It would them have been obvious to one skilled in the art to use birefringent element and half wave plate as the polarization rotation element to provide the 90 degree polarization rotation for the benefit of using known elements in the art to provide the desired polarization rotation. It is implicitly true that the position of the polarization rotation means does not affect it function, namely converting P-polarized light into S polarized light. It would then have been obvious to one skilled in the art to place it at desired location for the benefit of making the device fitted for specific applications.

With regard to claim 19, Chen et al teaches a folded arrangement of the diffractive optical elements and the reflector, (please see Figures 1, 4 and 6).

With regard to claim 20, Chen et al teaches a multiplex/demultiplexing device.

With regard to claim 32-33, it is implicitly true that the multiplex/demultiplexing device of Chen et al can be applied as an add/drop multiplexer or a spectrum analyzer, since it has the same structural as the instant application. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex parte Madham, 2 USPQ2d 1647 (1987).

7. Claims 21-24 and 25-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Mitamura et al (PB. 6,646,805) in view of the patent issued to Chen et al.

Mitamura et al teaches a device and method for *multiplexing and/or demultiplexing an optical signal* wherein the device comprises a *lens* (308, Figures 32-43) for directing a multiplexed optical signal along a predetermined path and a first *and second diffractive optical elements* (320, 321 Figure 32 or 438, 439 Figure 43) for performing a first and second diffractions on the optical signal to separate the multiplexed optical signal into a plurality of channels of different wavelength and further dispersing the channels and a *reflector* (309) for reflecting the plurality of channel after the second diffraction.

This reference has met all the limitations of the claims with the exception that it does not teach explicitly to use a plurality of waveguides to output the plurality of channels. **Chen** et al in the same field of endeavor teaches a multiplex/demultiplexing device wherein a waveguide array having at least one input fiber and a plurality of output fibers for inputting multiplexed optical signal into the device and outputting the multiple channels of the signal out of the device, (please see Figure 1). It would then have been obvious to apply the teachings of Chen et al to modify the arrangement of Mitamura et al to use waveguide array as means for efficiently inputting and outputting the optical signal.

Claim 25 has been amended to include the feature "a single fiber optic waveguide for carrying a multiplexed optical signal". This feature is confusing and indefinite since it is not clear how does it relate to the rest of the system. It therefore can only be examined in the broadest interpretation. **Chen et al** teaches explicitly that a single fiber optic waveguide can be used to carry multiplexed optical signal, (please see 4 in Figure 1 and 43 in Figure 6).

With regard to claims 22-23, the diffractions are performed by the first and second diffractive optical elements respectively, and the reflected multiple channels are transmitted through the first and second diffractive optical elements.

With regard to claim 26, Mitamura et al teaches that the diffractive optical element has a binary profile, (please see Figures 32 and 33).

With regard to claim 27, Mitamura et al does not teach explicitly that the first and second diffractive optical elements are angled. **Chen** et al in the same field of endeavor teaches that a pair of diffractive optical elements (70, 72, Figure 6) that are disposed at non-zero angle with respect to each other is used to achieve the multiplexing/multiplexing function. With regard to claim 28, Chen et al further teaches that the lens and reflector can be also at *angle* with respect to the diffractive optical element, (please see Figures 1-6). It would then have been obvious to one skilled in the art to apply the teachings of Chen et al to make the diffractive optical elements at non-zero angle with respect to each

other and the lens, the diffractive optical element and the reflector at angle to each other to make the device with more compact arrangement.

With regard to claim 29-30, Mitamura et al teaches that the inputted optical signal is demultiplexed by the system into a plurality of wavelength distinct channels and combined into multiplexed optical signal. (The amendment to claim 29 is very confusing and indefinite, it therefore can only be examined with the broadest interpretation).

With regard to claim 31, Mitamura et al teaches that the lens, the diffractive optical elements and the reflector are placed in a telemetric mode.

Response to Arguments

8. Applicant's arguments filed on June 3, 2005 have been fully considered but they are not persuasive. The newly amended claims and newly submitted claims have been fully considered and they are rejected for the reasons stated above.

9. In response to applicant's arguments which state that the cited Chen reference teaches that using two gratings will end up with longer mechanical path which will not suggest the benefits of a folded geometry arrangement with desired shape, the examiner respectfully disagrees for the reasons stated below. Chen et al **explicitly** discloses a *folded geometry of the multiplexing device* by using two diffractive optical elements having the two diffractive optical elements *angled* to each other so that the optical paths are **folded and** an **explicit** folded geometry with desired shape and compact structure is disclosed, (please see Figure 6). The folded geometry is implicitly compared with a non-folded conventional arrangement will suggest the benefit of more compact design. There is no hindsight in recognizing the *advantage* of designing a folded geometry by using two diffractive optical elements. A

longer mechanical path does not necessary suggest a less compact structure. If the longer mechanical path is *folded (as shown by Chen)* then the structure will still be compact. One skilled in the art therefore will be motivated by the explicit disclosure of Chen to use two diffractive optical elements angled to each other to fold the optical path so that making the device with desired shape to fit the particular requirement of the applications.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). For the reasons stated above, the possible modifications involve only rearranging parts that requires only general skill in the art.

10. In response to applicant's arguments concerning the Mitamura reference, the applicant is respectfully reminded that the feature concerning "demultiplexing a multiplexed signal into wavelength distinct signals and transmitting the wavelength distinct signals to an array of optical fiber" is not recited in the claims and therefore cannot be relied upon to overcome the rejection. It is not even clear where does this demultiplexation taking place? Furthermore, if the system of Mitamura is capable of handling wavelength distinct channels, (please see the figures showing explicit handling of different signals with different wavelengths), then whether the signal is coming as distinct channels or not they will be modulated by the system. Furthermore, Chen reference provides the teachings of the above-mentioned feature explicitly as one sees that demultiplexed signal can also be input in the system and to obtain a multiplexed signal in a single optic fiber, (i.e. taking a reverse path as shown in Figures 2 and 6).

Applicant being one skilled in the art would understand the by interchanging the roles of the input port and output port one can obtain either a multiplex or demultiplexing device.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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